

# **AUTOMATIC THREAD CUTTING APPARATUS FOR SEWING MACHINES**

## **FIELD OF THE INVENTION**

The present invention relates to an automatic thread  
5 cutting apparatus for sewing machines and particularly to a  
thread cutting apparatus that holds the yarn during yarn  
cutting after sewing operation has been completed for use in  
successive operations.

## **BACKGROUND OF THE INVENTION**

10 At present sewing technologies are quite mature. Adopted  
these technologies, textile industry is able to produce high  
quality clothes and garments at fast speed and lower costs to  
benefit people. Refer to FIGS. 1 and 2 for a conventional  
thread cutting apparatus used in sewing machines. It includes  
15 a first movable blade 61, a second movable blade 62, a first  
fixed blade 63 and a second fixed blade 64. The first movable  
blade 61 is for hooking a thread (not shown in the drawings).  
The first fixed blade 63 cuts off the thread. The second  
movable blade 62 is for hooking a bottom yarn, and the  
20 second fixed blade 64 cuts off the bottom yarn, then the  
bottom yarn (not shown in the drawings) is held. It needs two  
blades to cut off the thread and bottom yarn. The first and  
second movable blades 61 and 62, and the first and second  
fixed blades 63 and 64 are fastened to the bottom of a plate 65.  
25 When adjusting the angles of the movable blades 61 and 62,

and fixed blades 63 and 64 is required, the plate 65 has to be removed, and the adjustment is performed on the plate 65. After the adjustment is completed, the plate 65 is reassembled on a sewing deck (not shown in the drawings) of the sewing machine again. If the plate 65 is not properly aligned and reassembled, the adjusted angles could be invalid. It causes a lot of inconveniences.

### **SUMMARY OF THE INVENTION**

Therefore the primary object of the invention is to provide a thread cutting apparatus for sewing machines that employs a novel chain movement to drive the cutting mechanism of the sewing machines. The thread cutting apparatus according to the invention includes:

a thread cutter which consists of a cutting blade and fixed blades. The cutting blade and the fixed blades are mounted onto the top section of a sewing deck of the sewing machine. The fixed blades include an upper fixed blade and a lower fixed blade that are stacked over each other and spaced by a gap there between. The cutting blade may be swung through the upper and lower fixed blades to cut off the yarn. The cutting blade has a first cutting section to cut off the thread and a second cutting section to cut off the bottom yarn and clamp the remained portion of the bottom yarn. The first and second cutting sections have respectively a notch. The notch of the second cutting section is deeper than the notch of

the first cutting section;

a linkage mechanism which consists of a direction switch section, a first crank lever, a second crank lever, and a first and a second linkage bar that are interconnected with each other by said order. The second linkage bar is connected to the cutting blade; and

a driver which drives the linkage mechanism moving in two directions to move the thread cutter to cut off the yarn. The driver is mounted on a bracing section, which is connected to a direction switch section of the linkage mechanism.

Another object of the invention is to provide a thread cutting apparatus that is easy to adjust and align. The thread cutter is directly mounted onto the sewing deck and covered by the plate. Adjustment of the cutting blade and fixed blades may be accomplished directly on the sewing deck to avoid errors.

The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is an exploded view of a thread cutting apparatus of a conventional sewing machine.

FIG. 2 is a top view of a thread cutting apparatus of a

conventional sewing machine.

FIG. 3 is a perspective view of the present invention.

FIG. 4 is an exploded view of the present invention.

FIG. 5 is an enlarged perspective view of the thread cutter of  
5 the invention.

FIG. 6A is a top view of the thread cutting operation  
according to the invention.

FIG. 6B is a fragmentary enlarged view of FIG. 6A.

FIG. 6C is a top view of another thread cutting operation  
10 according to the invention.

FIG. 6D is a fragmentary enlarged view of FIG. 6C.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Please referring to FIG. 3, the automatic thread cutting  
15 apparatus 1 according to the invention includes a thread cutter  
10, a linkage mechanism 20 and a driver 30. The driver 30 is  
located on a bracing section 31 to provide driving power and  
drive the linkage mechanism 20 to operate. The linkage  
mechanism 20 moves the thread cutter 10 to cut off threads 50  
20 and a yarn 51(as shown intherebetween FIG. 6A).

Referring to FIG. 4, the driver 30 may be a bi-directional  
solenoid to drive the linkage mechanism 20 moving  
continuously in two directions and drive the thread cutter 10  
to cut off threads 50 and a yarn 51(as shown in FIG. 6A). The  
25 driver 30 is mounted onto the bracing section 31 and has a

moving section 34 coupling with a direction switch section 21 of the linkage mechanism 20. The bracing section 31 is connected to a damper plate 32 which is connected to an elastic element 33 to cushion shock. The elastic element 33 is  
5 a spring or an elastic reed. In this embodiment it is a spring.

The linkage mechanism 20 consists of the direction switch section 21, a first crank lever 22, a second crank lever 23, a first linkage bar 24 and a second linkage bar 16. The direction switch section 21 has one end normally connecting to one end  
10 of the first crank lever 22. The first crank lever 22 is connected normally to the second crank lever 23. The second crank lever 23 is connected to the first linkage bar 24. Finally the first linkage bar 24 is connected to the second linkage bar 16. The second linkage bar 16 is connected to a cutting blade  
15 11. The second crank lever 23 has a slot 25 and is fastened to a platen 42 through a fastener 26. The fastener 26 is a screw or a rivet. In this embodiment it is a screw.

The slot 25 enables the second crank lever 23 to slide. The second linkage bar 16 is formed substantially in a horse  
20 shoe shape and drives the cutting blade 11 in a swing manner between the first and second fixed blades 121 and 122 to cut off threads 50 and a yarn 51(as shown in FIG. 6A). In addition, the sewing machine has a sewing deck 41 with the platen 42 located on the top section thereof. The platen 42 has a sliding  
25 trough 421 on the front end to enable the first linkage bar 24

to slide thereon.

The thread cutter 10 includes the cutting blade 11 and fixed blades 12. The cutting blade 11 is mounted onto the top section of the sewing deck 41 through fasteners 13. The fixed  
5 blades 12 are fastened to the front end of the sewing deck 41 through fasteners 14. The fixed blades 12 include a upper fixed blade 121 and a lower fixed blade 122 that are stacked over each other and sandwiched by a pad 123 to form a gap 15 therebetween (as shown in FIG. 5) thereby the cutting blade  
10 11 can pass through to cut off threads 50 and a yarn 51(as shown in FIG. 6A). Moreover, the cutting blade 11 has a first cutting section 111 and a second cutting section 112 (as shown in FIGS. 4 and 5). The first cutting section 111 is to cut off the thread 50, and the second cutting section 112 is to cut of the  
15 bottom yarns 51 and clamps the remained portion of the bottom yarns 51. The first and second cutting sections 111 and 112 have respectively a first notch 113 and a second notch 114. The second notch 114 of the second cutting section 112 is deeper than the first notch 113 of the first cutting section 111.

20 Referring to FIGS. 5, 6A through 6D, the driver 30 provides a continuous and bi-directional movement. When it drives the moving section 34 rearwards, the direction switch section 21 is moved rearwards, and the first crank lever 22 connected the direction switch section 21 is moved rearwards,  
25 the second crank lever 23 which connects to the first crank

lever 22 also is moved rearwards, and the first linkage bar 24 which connects to one end of the second crank lever 23 also is moved rearwards, hence the first linkage bar 24 is moved in the sliding trough 421 and drives the second linkage bar 16 turning clockwise, and the cutting blade 11 is swung clockwise between the upper and lower fixed blades 121 and 122. Meanwhile, the thread 50 is located in the first notch 113 of the first cutting section 111 and cut off by the upper and lower blades 121 and 122. While the bottom yarn 51 is cut off by the second cutting section 112 in the deeper second notch 114, the remaining portion of the bottom yarn 51 is held. When the driver 30 drives the moving section 34 forwards, the linkage motions are opposite to when have been depicted above, and the cutting blade 11 is moved slightly outwards counterclockwise.

While the preferred embodiments of the invention have been set forth for the purpose of disclosure, modifications of the disclosed embodiments of the invention as well as other embodiments thereof may occur to those skilled in the art. Accordingly, the appended claims are tended to cover all embodiments which do not depart from the spirit and scope of the invention.